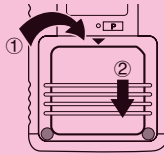


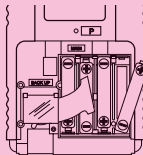
BEFORE USING THE CALCULATOR FOR THE FIRST TIME...

This calculator does not contain any main batteries when you purchase it. Be sure to perform the following procedure to load batteries, reset the calculator, and adjust the contrast before trying to use the calculator for the first time.

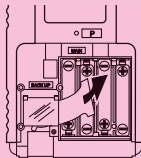
1. Remove the back cover from the calculator by pressing it in the direction indicated by arrow ①, and then sliding it in the direction indicated by arrow ②.



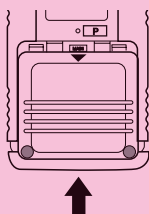
2. Load the four batteries that come with calculator.
 - Make sure that the positive (+) and negative (-) ends of the batteries are facing correctly.



3. Remove the insulating sheet at the location marked "BACK UP" by pulling in the direction indicated by the arrow.



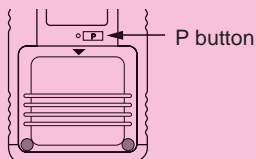
4. Replace the back cover onto the calculator and turn the calculator front side up, which should automatically turn on power and perform the memory reset operation.



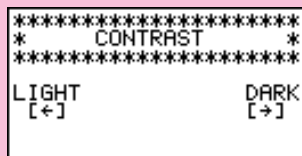
```
*****  
* MEMORY CLEARED! *  
* PRESS [MENU] KEY *  
*****
```

5. Press **MENU** .

If the Main Menu shown to the right is not on the display, press the P button on the back of the calculator to perform memory reset.



6. Use the cursor keys (**▲**, **▼**, **◀**, **▶**) to select the **CONT** icon and press **EXE** or simply press **sin** to display the contrast adjustment screen.

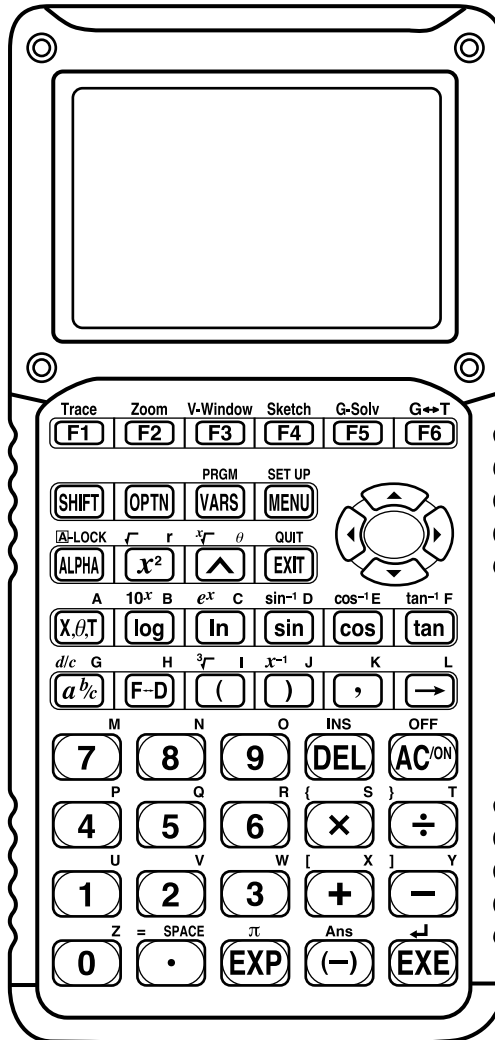


7. Use **◀** and **▶** to adjust contrast.

- **◀** makes figures on the screen lighter, while **▶** makes them darker.
- Holding down **◀** or **▶** changes the contrast setting at high speed.

8. After adjusting the contrast, press **MENU** to return to the Main Menu.

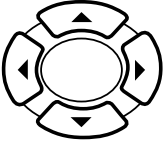
KEYS



Alpha Lock

Normally, once you press \square and then a key to input an alphabetic character, the keyboard reverts to its primary functions immediately. If you press \square and then \square , the keyboard locks in alpha input until you press \square again.

KEY TABLE

| | | | | | | | | | | | |
|---|-------------|--|-------------|---------------------------------|-------------|-----------------------------|-------------|---|-------------|--------------------------------------|-------------|
| Trace F1 | Page 146 | Zoom F2 | Page 151 | V-Window F3 | Page 129 | Sketch F4 | Page 174 | G-Solv F5 | Page 164 | G \leftrightarrow T F6 | Page 136 |
| SHIFT | 2 | OPTN | 31 | PRGM VARS | 333 33 | SET UP MENU | 4 3 |  | | | |
| $\overline{\Delta}$ -LOCK ALPHA | 2 | $\sqrt{\quad}$ x² | 57 57 | $\sqrt{\quad}$ ^ | 56 56 | QUIT EXIT | 55 | | | | |
| A X, θ, T | 59 | 10^x B log | 56 56 | e^x C In | 56 56 | \sin^{-1} D sin | 55 55 | | | | |
| d/c G a^{b/c} | 59 | H F\leftrightarrowD | 56 | $\sqrt[3]{\quad}$ I (| 57 46 | x^{-1} J) | 57 46 | | | | |
| | | | | | | | | \cos^{-1} E cos | 55 55 | \tan^{-1} F tan | 55 55 |
| | | | | | | | | K , | | L \rightarrow | 25 |
| | Page | | Page | | Page | | Page | | Page | | Page |
| M 7 | | N 8 | | O 9 | | INS DEL | 24 23 | OFF AC/ON | | | |
| P 4 | | Q 5 | | R 6 | | { x | 46 | } \div | 46 | | |
| U 1 | | V 2 | | W 3 | | [+ | 46 |] Y - | 46 | | |
| Z 0 | | = SPACE . | | π EXP | 55 46 | Ans (-) | 49 46 | \leftarrow EXE | | | |

Quick-Start

Switching Power On And Off

Auto Power Off Function

Using Modes

Basic Calculations

Replay Features

Fraction Calculations

Exponents

Graph Functions

Dual Graph

Box Zoom

Dynamic Graph

Table Function

Welcome to the world of graphing calculators and the CASIO fx-9750G.

Quick-Start is not a complete tutorial, but it takes you through many of the most common functions, from turning the power on to graphing complex equations. When you're done, you'll have mastered the basic operation of the fx-9750G and will be ready to proceed with the rest of this manual to learn the entire spectrum of functions available.

Each step of the examples in Quick-Start is shown graphically to help you follow along quickly and easily. When you need to enter the number 57, for example, we've indicated it as follows:

Press **5** **7**

Whenever necessary, we've included samples of what your screen should look like. If you find that your screen doesn't match the sample, you can restart from the beginning by pressing the "All Clear" button **AC/ON**.

SWITCHING POWER ON AND OFF

To switch power on, press **AC/ON**.

To switch power off, press **SHIFT** **AC/ON**^{OFF}.

AUTO POWER OFF FUNCTION

Note that the unit automatically switches power off if you do not perform any operation for about six minutes (about 60 minutes when a calculation is stopped by an output command (▲)).

USING MODES

The fx-9750G makes it easy to perform a wide range of calculations by simply selecting the appropriate mode. Before getting into actual calculations and operation examples, let's take a look at how to navigate around the modes.

To select the RUN Mode

1. Press **MENU** to display the Main Menu.



2. Use     to highlight **RUN** and then press .


This is the initial screen of the RUN mode, where you can perform manual calculations, and run programs.



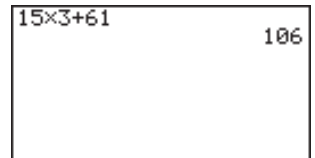
BASIC CALCULATIONS

With manual calculations, you input formulas from left to right, just as they are written on paper. With formulas that include mixed arithmetic operators and parentheses, the calculator automatically applies true algebraic logic to calculate the result.

Example: $15 \times 3 + 61$

1. Press  to clear the calculator.

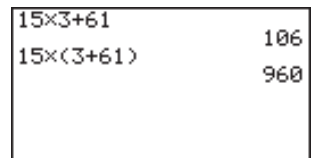
2. Press        .



Parentheses Calculations

Example: $15 \times (3 + 61)$

1. Press     
    .



Built-In Functions

The fx-9750G includes a number of built-in scientific functions, including trigonometric and logarithmic functions.

Example: $25 \times \sin 45^\circ$

Important!

Be sure that you specify Deg (degrees) as the angle unit before you try this example.

1. Press **AC/ON**.
2. Press **SHIFT** **MENU** to switch the set up display.

```

Mode           :Comp
Func Type     :Y=
Draw Type     :Connect
Derivative    :Off
Angle         :Rad
Coord         :On
Grid          :Off
|ComF|Dec|Hex|Bin|Oct
    
```

3. Press **▼** **▼** **▼** **▼** **F1** (Deg) to specify degrees as the angle unit.

```

Mode           :Comp
Func Type     :Y=
Draw Type     :Connect
Derivative    :Off
Angle         :Deg
Coord         :On
Grid          :Off
|Deg|Rad|Gra
    
```

4. Press **EXIT** to clear the menu.
5. Press **AC/ON** to clear the unit.
6. Press **2** **5** **×** **sin** **4** **5** **EXE**.

```

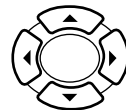
25×sin 45
17.67766953
    
```

REPLAY FEATURES

With the replay feature, simply press **◀** or **▶** to recall the last calculation that was performed. This recalls the calculation so you can make changes or re-execute it as it is.

Example: To change the calculation in the last example from $(25 \times \sin 45^\circ)$ to $(25 \times \sin 55^\circ)$

1. Press **◀** to display the last calculation.
2. Press **◀** twice to move the cursor under the 4.
3. Press **5**.
4. Press **EXE** to execute the calculation again.



```

25×sin 55
20.47880111
    
```

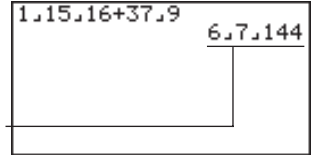

FRACTION CALCULATIONS

You can use the $\frac{a}{b}$ key to input fractions into calculations. The symbol “ \lrcorner ” is used to separate the various parts of a fraction.

Example: $1\frac{15}{16} + \frac{37}{9}$

1. Press AC/ON .

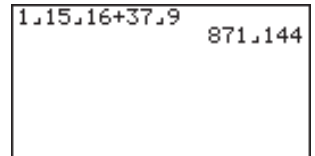
2. Press $\boxed{1}$ $\frac{a}{b}$ $\boxed{1}$ $\boxed{5}$ $\frac{a}{b}$
 $\boxed{1}$ $\boxed{6}$ $\boxed{+}$ $\boxed{3}$ $\boxed{7}$ $\frac{a}{b}$
 $\boxed{9}$ $\boxed{\text{EXE}}$.



Converting a Mixed Fraction to an Improper Fraction

While a mixed fraction is shown on the display, press SHIFT $\frac{d}{c}$ to convert it to an improper fraction.

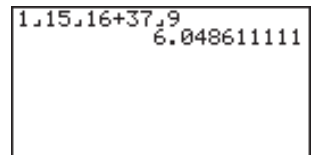
Press SHIFT $\frac{d}{c}$ again to convert back to a mixed fraction.



Converting a Fraction to Its Decimal Equivalent

While a fraction is shown on the display, press $\text{F}\leftrightarrow\text{D}$ to convert it to its decimal equivalent.

Press $\text{F}\leftrightarrow\text{D}$ again to convert back to a fraction.



EXPONENTS

Example: 1250×2.06^5

1. Press **AC/ON**.
2. Press **1** **2** **5** **0** **X** **2** **.** **0** **6**.
3. Press **^** and the ^ indicator appears on the display.
4. Press **5**. The ^5 on the display indicates that 5 is an exponent.
5. Press **EXE**.

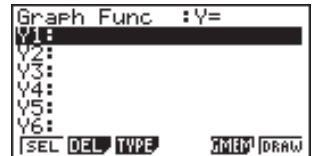
| |
|-------------------------------------|
| 1250×2.06^5 46370.96297 |
|-------------------------------------|

GRAPH FUNCTIONS

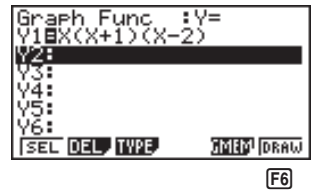
The graphing capabilities of this calculator makes it possible to draw complex graphs using either rectangular coordinates (horizontal axis: x ; vertical axis: y) or polar coordinates (angle: θ ; distance from origin: r).

Example 1: To graph $Y = X(X + 1)(X - 2)$

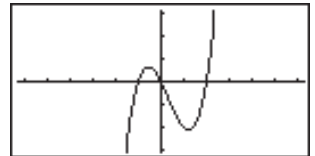
1. Press **MENU**.
2. Use **◀**, **▶**, **▲**, and **▼** to highlight **GRAPH**, and then press **EXE**.



3. Input the formula.

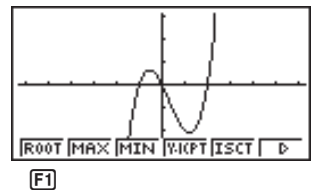


4. Press **F6** (DRAW) or **EXE** to draw the graph.

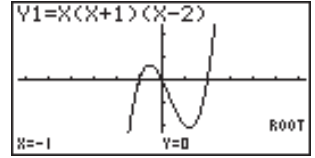


Example 2: To determine the roots of $Y = X(X + 1)(X - 2)$

1. Press **SHIFT** **F5** (G-Solv).

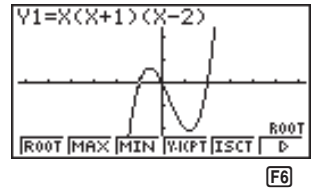


2. Press **F1** (ROOT).
 Press **▶** for other roots.

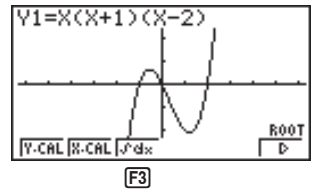


Example 3: Determine the area bounded by the origin and the $X = -1$ root obtained for $Y = X(X + 1)(X - 2)$

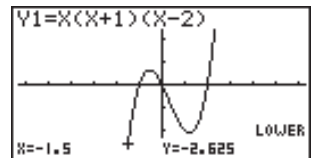
1. Press **SHIFT** **F5** (G-Solv).



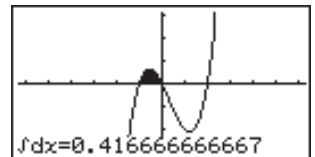
2. Press **F6** (▷).



3. Press **F3** ($\int dx$).



4. Use **▶** to move the pointer to the location where $X = -1$, and then press **EXE**. Next, use **▶** again to move the pointer to the location where $X = 0$, and then press **EXE** to input the integration range, which becomes shaded on the display.



DUAL GRAPH

With this function you can split the display between two areas and display two graphs on the same screen.

Example: To draw the following two graphs and determine the points of intersection

$$Y1 = X(X + 1)(X - 2)$$

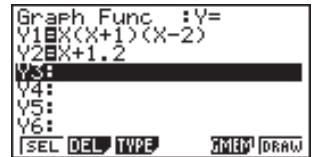
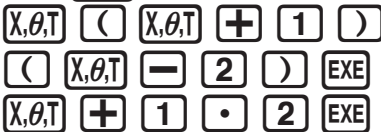
$$Y2 = X + 1.2$$

1. Press **SHIFT** **SETUP** **▼** **▼** **F1** (Grph) to specify "Graph" for the Dual Screen setting.



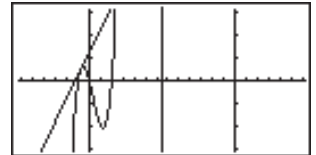
F1

2. Press **EXIT**, and then input the two functions.



F6

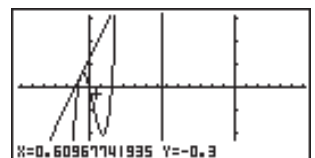
3. Press **F6** (DRAW) or **EXE** to draw the graphs.



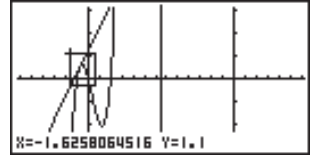
BOX ZOOM

Use the Box Zoom function to specify areas of a graph for enlargement.

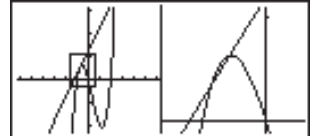
1. Press **SHIFT** **F2** (Zoom) **F1** (BOX).
2. Use **◀**, **▶**, **▲**, and **▼** to move the pointer to one corner of the area you want to specify and then press **EXE**.



3. Use \leftarrow , \rightarrow , \uparrow , and \downarrow to move the pointer again. As you do, a box appears on the display. Move the pointer so the box encloses the area you want to enlarge.



4. Press $\boxed{\text{EXE}}$, and the enlarged area appears in the inactive (right side) screen.



DYNAMIC GRAPH

Dynamic Graph lets you see how the shape of a graph is affected as the value assigned to one of the coefficients of its function changes.

Example: To draw graphs as the value of coefficient A in the following function changes from 1 to 3

$$Y = AX^2$$

1. Press $\boxed{\text{MENU}}$.
2. Use \leftarrow , \rightarrow , \uparrow , and \downarrow to highlight **DYNA**, and then press $\boxed{\text{EXE}}$.



3. Input the formula.

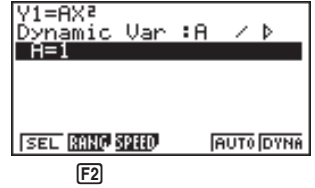
$\boxed{\text{ALPHA}}$ $\boxed{\text{A}}$ $\boxed{\text{X},\theta,\text{T}}$ $\boxed{\text{x}^2}$ $\boxed{\text{EXE}}$



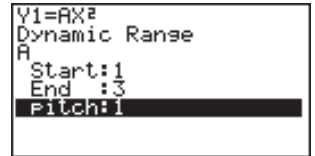
$\boxed{\text{F4}}$

Quick-Start

4. Press **F4** (VAR) **1** **EXE** to assign an initial value of 1 to coefficient A.



5. Press **F2** (RANG) **1** **EXE** **3** **EXE** **1** **EXE** to specify the range and increment of change in coefficient A.



6. Press **EXIT**.

7. Press **F6** (DYNA) to start Dynamic Graph drawing. The graphs are drawn 10 times.

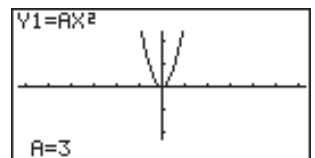
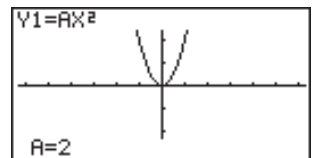
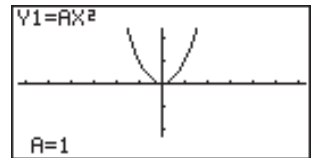
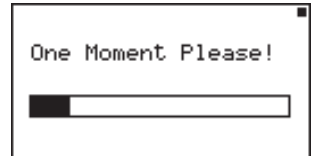


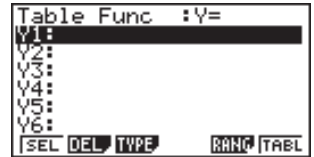
TABLE FUNCTION

The Table Function makes it possible to generate a table of solutions as different values are assigned to the variables of a function.

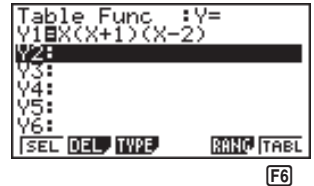
Example: To create a number table for the following function

$$Y = X(X+1)(X-2)$$

1. Press **MENU**.
2. Use **◀**, **▶**, **▲**, and **▼** to highlight **TABLE**, and then press **EXE**.



3. Input the formula.



4. Press **F6** (TABL) or **EXE** to generate the number table.

| X | Y1 |
|---|----|
| 1 | -2 |
| 2 | 0 |
| 3 | 12 |
| 4 | 40 |

After you've completed this Quick-Start section, you are well on your way to becoming an expert user of the CASIO fx-9750G.

To learn all about the many powerful features of the fx-9750G, read on and explore!

Handling Precautions

- Your calculator is made up of precision components. Never try to take it apart.
- Avoid dropping your calculator and subjecting it to strong impact.
- Do not store the calculator or leave it in areas exposed to high temperatures or humidity, or large amounts of dust. When exposed to low temperatures, the calculator may require more time to display results and may even fail to operate. Correct operation will resume once the calculator is brought back to normal temperature.
- The display will go blank and keys will not operate during calculations. When you are operating the keyboard, be sure to watch the display to make sure that all your key operations are being performed correctly.
- Replace the main batteries once every 2 years regardless of how much the calculator is used during that period. Never leave dead batteries in the battery compartment. They can leak and damage the unit.
- Keep batteries out of the reach of small children. If swallowed, consult with a physician immediately.
- Avoid using volatile liquids such as thinner or benzine to clean the unit. Wipe it with a soft, dry cloth, or with a cloth that has been dipped in a solution of water and a neutral detergent and wrung out.
- In no event will the manufacturer and its suppliers be liable to you or any other person for any damages, expenses, lost profits, lost savings or any other damages arising out of loss of data and/or formulas arising out of malfunction, repairs, or battery replacement. The user should prepare physical records of data to protect against such data loss.
- Never dispose of batteries, the liquid crystal panel, or other components by burning them.
- When the “Low battery!” message appears on the display, replace the main power supply batteries as soon as possible.
- Be sure that the power switch is set to OFF when replacing batteries.
- If the calculator is exposed to a strong electrostatic charge, its memory contents may be damaged or the keys may stop working. In such a case, perform the All Reset operation to clear the memory and restore normal key operation.
- If the calculator stops operating correctly for some reason, use a thin, pointed object to press the P button on the back of the calculator. Note, however, that this clears all the data in calculator memory.
- Note that strong vibration or impact during program execution can cause execution to stop or can damage the calculator’s memory contents.
- Using the calculator near a television or radio can cause interference with TV or radio reception.
- Before assuming malfunction of the unit, be sure to carefully reread this manual and ensure that the problem is not due to insufficient battery power, programming or operational errors.

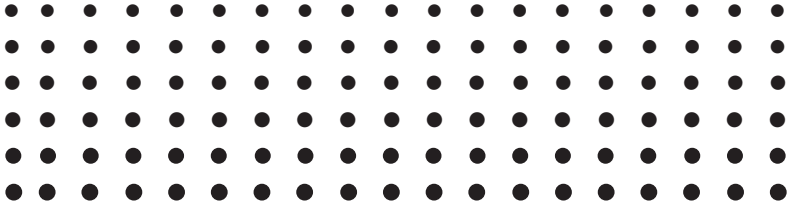
Be sure to keep physical records of all important data!

The large memory capacity of the unit makes it possible to store large amounts of data. You should note, however, that low battery power or incorrect replacement of the batteries that power the unit can cause the data stored in memory to be corrupted or even lost entirely. Stored data can also be affected by strong electrostatic charge or strong impact.

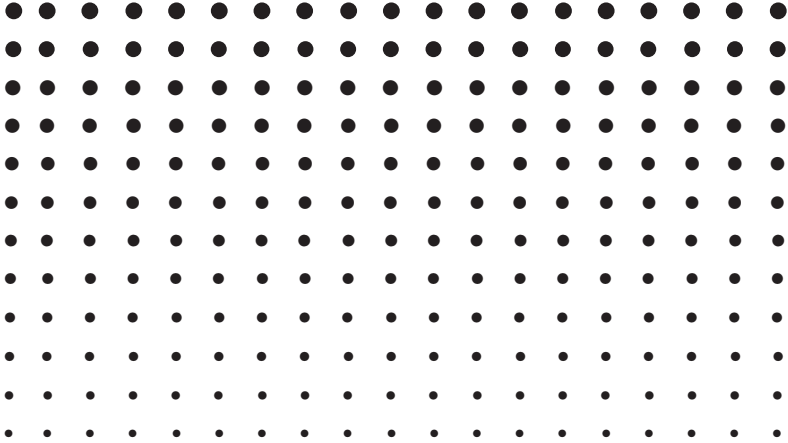
Since this calculator employs unused memory as a work area when performing its internal calculations, an error may occur when there is not enough memory available to perform calculations. To avoid such problems, it is a good idea to leave 1 or 2 kbytes of memory free (unused) at all times.

In no event shall CASIO Computer Co., Ltd. be liable to anyone for special, collateral, incidental, or consequential damages in connection with or arising out of the purchase or use of these materials. Moreover, CASIO Computer Co., Ltd. shall not be liable for any claim of any kind whatsoever against the use of these materials by any other party.

- The contents of this manual are subject to change without notice.
- No part of this manual may be reproduced in any form without the express written consent of the manufacturer.
- The options described in Chapter 20 of this manual may not be available in certain geographic areas. For full details on availability in your area, contact your nearest CASIO dealer or distributor.



fx-9750G



Contents

| | |
|---|-----------|
| Getting Acquainted — Read This First! | 1 |
| 1. Key Markings | 2 |
| 2. Selecting Icons and Entering Modes | 3 |
| Using the Set Up Screen | 4 |
| Set Up Screen Function Key Menus | 5 |
| 3. Display | 10 |
| About the Display Screen | 10 |
| About Menu Item Types | 10 |
| Exponential Display | 11 |
| Special Display Formats | 12 |
| Calculation Execution Screen | 12 |
| 4. Contrast Adjustment | 13 |
| 5. When you keep having problems... | 14 |
| Get the Calculator Back to its Original Mode Settings | 14 |
| In Case of Hang Up | 14 |
| Low Battery Message | 14 |
| | |
| Chapter 1 Basic Operation | 15 |
| 1-1 Before Starting Calculations... | 16 |
| Setting the Angle Unit (Angle) | 16 |
| Setting the Display Format (Display) | 16 |
| Inputting Calculations | 19 |
| Calculation Priority Sequence | 19 |
| Multiplication Operations without a Multiplication Sign | 20 |
| Stacks | 21 |
| Input, Output and Operation Limitations | 21 |
| Overflow and Errors | 22 |
| Memory Capacity | 22 |
| Graphic Display and Text Display | 23 |
| Editing Calculations | 23 |
| 1-2 Memory | 25 |
| Variables | 25 |
| Function Memory | 26 |
| Memory Status (MEM) | 28 |
| Clearing Memory Contents | 30 |
| 1-3 Option (OPTN) Menu | 31 |
| 1-4 Variable Data (VARs) Menu | 33 |
| 1-5 Program (PRGM) Menu | 43 |

| | |
|---|---------------|
| Chapter 2 Manual Calculations | 45 |
| 2-1 Basic Calculations | 46 |
| Arithmetic Calculations | 46 |
| Number of Decimal Places, Number of Significant Digits, Exponential Notation Range | 46 |
| Calculations Using Variables | 48 |
| 2-2 Special Functions | 49 |
| Answer Function | 49 |
| Performing Continuous Calculations | 49 |
| Using the Replay Function | 50 |
| Making Corrections in the Original Calculation | 50 |
| Using Multistatements | 51 |
| 2-3 Function Calculations | 52 |
| Function Menus | 52 |
| Angle Units | 55 |
| Trigonometric and Inverse Trigonometric Functions | 55 |
| Logarithmic and Exponential Functions | 56 |
| Hyperbolic and Inverse Hyperbolic Functions | 56 |
| Other Functions | 57 |
| Coordinate Conversion | 58 |
| Permutation and Combination | 58 |
| Fractions | 59 |
| Engineering Notation Calculations | 60 |
| Logical Operators (AND, OR, NOT) | 61 |
| Chapter 3 Solve, Differential/Quadratic Differential, Integration, Maximum/Minimum Value, and Σ Calculations | 63 |
| 3-1 Function Analysis Menu | 64 |
| 3-2 Solve Calculations | 65 |
| 3-3 Differential Calculations | 67 |
| Applications of Differential Calculations | 69 |
| 3-4 Quadratic Differential Calculations | 70 |
| Quadratic Differential Applications | 71 |
| 3-5 Integration Calculations | 72 |
| Application of Integration Calculation | 73 |
| 3-6 Maximum/Minimum Value Calculations | 75 |
| 3-7 Σ Calculations | 77 |
| Example Σ Calculation | 77 |
| Σ Calculation Applications | 78 |

Σ Calculation Precautions 78

Chapter 4 Complex Numbers 79

4-1 Before Beginning a Complex Number Calculation 80

4-2 Performing Complex Number Calculations 81

Arithmetic Operations 81

Reciprocals, Square Roots, and Squares 81

Absolute Value and Argument 82

Conjugate Complex Numbers 82

Extraction of Real and Imaginary Number Parts 83

4-3 Complex Number Calculation Precautions 84

Chapter 5 Binary, Octal, Decimal, and Hexadecimal Calculations 85

5-1 Before Beginning a Binary, Octal, Decimal, or Hexadecimal Calculation 86

5-2 Selecting a Number System 88

5-3 Arithmetic Operations 89

5-4 Negative Values and Logical Operations 90

Negative Values 90

Logical Operations 90

Chapter 6 Matrix Calculations 91

6-1 Before Performing Matrix Calculations 92

About Matrix Answer Memory (MatAns) 92

Creating a Matrix 92

Deleting Matrices 93

6-2 Matrix Cell Operations 95

Row Calculations 95

Row Operations 97

Column Operations 99

6-3 Modifying Matrices Using Matrix Commands 101

Matrix Data Input Format 101

Modifying Matrices Using Matrix Commands 103

6-4 Matrix Calculations 106

Matrix Arithmetic Operations 106

Matrix Scalar Product 108

Determinant 109

| | |
|---|-----|
| Matrix Transposition | 110 |
| Matrix Inversion | 110 |
| Squaring a Matrix | 111 |
| Raising a Matrix to a Power | 112 |
| Determining the Absolute Value, Integer Part, Fraction Part, and Maximum Integer of a Matrix | 113 |

Chapter 7 Equation Calculations 115

| | |
|--|------------|
| 7-1 Before Beginning an Equation Calculations | 116 |
| Entering an Equation Calculation Mode | 116 |
| Clearing Equation Memories | 116 |
| 7-2 Linear Equations with Two to Six Unknowns | 117 |
| Entering the Linear Equation Mode for Two to Six Unknowns | 117 |
| Solving Linear Equations with Three Unknowns | 118 |
| Changing Coefficients | 119 |
| Clearing All the Coefficients | 119 |
| 7-3 Quadratic and Cubic Equations | 120 |
| Entering the Quadratic/Cubic Equation Mode | 120 |
| Solving a Quadratic or Cubic Equation | 120 |
| Quadratic equations that produce multiple root (1 or 2) solutions or imaginary number solutions | 121 |
| Changing Coefficients | 122 |
| Clearing All the Coefficients | 122 |
| 7-4 What to Do When an Error Occurs | 123 |

Chapter 8 Graphing 125

| | |
|--|------------|
| 8-1 Before Trying to Draw a Graph | 126 |
| Entering the Graph Mode | 126 |
| 8-2 View Window (V-Window) Settings | 127 |
| Initializing and Standardizing the View Window | 129 |
| View Window Memory | 130 |
| 8-3 Graph Function Operations | 132 |
| Specifying the Graph Type | 132 |
| Storing Graph Functions | 132 |
| Editing Functions in Memory | 134 |
| Drawing a Graph | 135 |
| 8-4 Graph Memory | 138 |
| 8-5 Drawing Graphs Manually | 140 |

| | | |
|-------------------|--|------------|
| 8-6 | Other Graphing Functions | 146 |
| | Connect Type and Plot Type Graphs (Draw Type) | 146 |
| | Trace | 146 |
| | Scroll | 149 |
| | Graphing in a Specific Range | 149 |
| | Overwrite | 149 |
| | Zoom | 151 |
| | Using the Auto View Window | 154 |
| | Adjusting the Ranges of a Graph (SQR) | 155 |
| | Rounding Coordinates (RND) | 156 |
| | Converting x - and y -axis Values to Integers (INTG) | 157 |
| | Returning the View Window to Its Previous Settings | 158 |
| 8-7 | Picture Memory | 159 |
| 8-8 | Graph Background | 161 |
| Chapter 9 | Graph Solve | 163 |
| 9-1 | Before Using Graph Solve | 164 |
| 9-2 | Analyzing a Function Graph | 165 |
| | Determining Roots | 165 |
| | Determining Maximums and Minimums | 166 |
| | Determining y -intercepts | 167 |
| | Determining Points of Intersection for Two Graphs | 168 |
| | Determining a Coordinate (x for a given y / y for a given x) | 169 |
| | Determining the Integral for Any Range | 171 |
| 9-3 | Graph Solve Precautions | 172 |
| Chapter 10 | Sketch Function | 173 |
| 10-1 | Before Using the Sketch Function | 174 |
| 10-2 | Graphing with the Sketch Function | 176 |
| | Tangent | 176 |
| | Line Normal to a Curve | 177 |
| | Graphing an Inverse Function | 178 |
| | Plotting Points | 179 |
| | Turning Plot Points On and Off | 181 |
| | Drawing a Line | 182 |
| | Drawing a Circle | 184 |
| | Drawing Vertical and Horizontal Lines | 185 |
| | Freehand Drawing | 185 |
| | Comment Text | 186 |
| | Turning Pixels On and Off | 187 |

Clearing Drawn Lines and Points 188

Chapter 11 Dual Graph 189

11-1 Before Using Dual Graph 190
 About Dual Graph Screen Types 190

11-2 Specifying the Left and Right View Window Parameters 192

11-3 Drawing a Graph in the Active Screen 194

11-4 Displaying a Graph in the Inactive Screen 195
 Before Displaying a Graph in the Inactive Screen 195
 Copying the Active Graph to the Inactive Screen 195
 Switching the Contents of the Active and Inactive Screens 196
 Drawing Different Graphs on the Active Screen and Inactive Screen 196
 Other Graph Functions with Dual Graph 199

Chapter 12 Graph-to-Table 201

12-1 Before Using Graph-to-Table 202

12-2 Using Graph-to-Table 203

12-3 Graph-to-Table Precautions 206

Chapter 13 Dynamic Graph 207

13-1 Before Using Dynamic Graph 208

13-2 Storing, Editing, and Selecting Dynamic Graph Functions 209

13-3 Drawing a Dynamic Graph 210
 10-time Continuous Drawing 213
 Continuous Drawing 215
 Stop & Go Drawing 216

13-4 Using Dynamic Graph Memory 218

13-5 Dynamic Graph Application Examples 220

Chapter 14 Implicit Function Graphs 223

14-1 Before Graphing an Implicit Function 224
 Entering the CONICS Mode 224

14-2 Graphing an Implicit Function 225

14-3 Implicit Function Graph Analysis 228

14-4 Implicit Function Graphing Precautions 233

| | |
|--|------------|
| Chapter 15 Table & Graph | 235 |
| 15-1 Before Using Table & Graph | 236 |
| 15-2 Storing a Function and Generating a Numeric Table | 237 |
| Variable Specifications | 237 |
| Generating a Table | 238 |
| Specifying the function type | 240 |
| 15-3 Editing and Deleting Functions | 241 |
| 15-4 Editing Tables and Drawing Graphs | 242 |
| Row Operations | 243 |
| Deleting a Table | 244 |
| Graphing a Function | 245 |
| 15-5 Copying a Table Column to a List | 248 |
| | |
| Chapter 16 Recursion Table and Graph | 249 |
| 16-1 Before Using the Recursion Table and Graph Function | 250 |
| 16-2 Inputting a Recursion Formula and Generating a Table | 251 |
| 16-3 Editing Tables and Drawing Graphs | 256 |
| Before Drawing a Graph for a Recursion Formula | 257 |
| Drawing a Convergence/Divergence Graph (WEB graph) | 258 |
| | |
| Chapter 17 List Function | 263 |
| List Data Linking | 264 |
| 17-1 List Operations | 265 |
| 17-2 Editing and Rearranging Lists | 268 |
| Editing List Values | 268 |
| Sorting List Values | 270 |
| 17-3 Manipulating List Data | 272 |
| Accessing the List Data Manipulation Function Menu | 272 |
| 17-4 Arithmetic Calculations Using Lists | 278 |
| Error Messages | 278 |
| Inputting a List into a Calculation | 278 |
| Recalling List Contents | 280 |
| Graphing a Function Using a List | 280 |
| Inputting Scientific Calculations into a List | 280 |
| Performing Scientific Function Calculations Using a List | 281 |
| 17-5 Switching Between List Files | 282 |

| | |
|---|------------|
| Chapter 18 Statistical Graphs and Calculations | 283 |
| 18-1 Before Performing Statistical Calculations | 284 |
| 18-2 Paired-Variable Statistical Calculation Examples | 285 |
| Inputting Data into Lists | 285 |
| Plotting Data | 285 |
| Plotting a Scatter Diagram | 286 |
| Changing Graph Parameters | 286 |
| 1. Graph draw/non-draw status (SELECT) | 287 |
| 2. General graph settings (SET) | 288 |
| Drawing an xy Line Graph | 292 |
| Selecting the Regression Type | 292 |
| Displaying Statistical Calculation Results | 293 |
| Graphing Statistical Calculation Results | 293 |
| 18-3 Calculating and Graphing Single-Variable Statistical Data | 294 |
| Drawing a Histogram (Bar Graph) | 294 |
| Med-Box Graph (Med-Box) | 294 |
| Mean-box Graph | 294 |
| Normal Distribution Curve | 295 |
| Line Graph | 295 |
| Displaying Single-Variable Statistical Results | 296 |
| 18-4 Calculating and Graphing Paired-Variable Statistical Data | 297 |
| Linear Regression Graph | 297 |
| Med-Med Graph | 297 |
| Quadratic/Cubic/Quartic Regression Graph | 298 |
| Logarithmic Regression Graph | 299 |
| Exponential Regression Graph | 299 |
| Power Regression Graph | 300 |
| Displaying Paired-Variable Statistical Results | 301 |
| Copying a Regression Graph Formula to the Graph Mode | 302 |
| Multiple Graphs | 302 |
| 18-5 Other Graphing Functions | 304 |
| Manual Graphing | 304 |
| Setting the Width of a Histogram/Line Graph | 304 |
| 18-6 Performing Statistical Calculations | 305 |
| Single-Variable Statistical Calculations | 305 |
| Paired-Variable Statistical Calculations | 306 |
| Regression Calculation | 306 |
| Estimated Value Calculation (\hat{x} , \hat{y}) | 307 |
| Probability Distribution Calculation and Graphing | 308 |
| Probability Graphing | 311 |

| | |
|--|------------|
| Chapter 19 Programming | 313 |
| 19-1 Before Programming | 314 |
| 19-2 Programming Examples | 315 |
| 19-3 Debugging a Program | 321 |
| 19-4 Calculating the Number of Bytes Used by a Program | 322 |
| 19-5 Secret Function | 323 |
| 19-6 Searching for a File | 325 |
| 19-7 Searching for Data Inside a Program | 327 |
| 19-8 Editing File Names and Program Contents | 328 |
| 19-9 Deleting a Program | 332 |
| 19-10 Useful Program Commands | 333 |
| 19-11 Command Reference | 337 |
| Command Index | 337 |
| Basic Operation Commands | 338 |
| Program Commands (COM) | 339 |
| Program Control Commands (CTL) | 343 |
| Jump Commands (JUMP) | 345 |
| Clear Commands (CLR) | 347 |
| Display Commands (DISP) | 347 |
| Input/Output Commands (I/O) | 350 |
| Conditional Jump Relational Operators (REL) | 352 |
| 19-12 Text Display | 353 |
| 19-13 Using Calculator Functions in Programs | 354 |
| Using Matrix Row Operations in a Program | 354 |
| Using Graph Functions in a Program | 355 |
| Using Dynamic Graph Functions in a Program | 356 |
| Using Table & Graph Functions in a Program | 357 |
| Using Recursion Table & Graph Functions in a Program | 358 |
| Using List Sort Functions in a Program | 359 |
| Using Statistical Calculations and Graphs in a Program | 359 |
| Performing Statistical Calculations | 361 |
| Chapter 20 Data Communications | 363 |
| 20-1 Connecting Two Units | 364 |
| 20-2 Connecting the Unit with a Personal Computer | 365 |
| 20-3 Connecting the Unit with a CASIO Label Printer | 366 |
| 20-4 Before Performing a Data Communication Operation | 367 |


| | | |
|-------------------|--|------------|
| 20-5 | Performing a Data Transfer Operation | 368 |
| 20-6 | Screen Send Function | 372 |
| 20-7 | Data Communications Precautions | 373 |
| Chapter 21 | Program Library | 375 |
| 1. | Prime Factor Analysis | 376 |
| 2. | Greatest Common Measure | 378 |
| 3. | <i>t</i> -Test Value | 380 |
| 4. | Circle and Tangents | 382 |
| 5. | Rotating a Figure | 389 |
| Appendix | | 393 |
| Appendix A | Resetting the Calculator | 394 |
| Appendix B | Power Supply | 396 |
| | Replacing Batteries | 396 |
| | About the Auto Power Off Function | 398 |
| Appendix C | Error Message Table | 399 |
| Appendix D | Input Ranges | 401 |
| Appendix E | 2-byte Command Table | 404 |
| Appendix F | Specifications | 405 |
| Index | | 410 |
| Command Index | | 416 |
| Key Index | | 417 |


Getting Acquainted

— Read This First!

The symbols in this manual indicate the following messages.

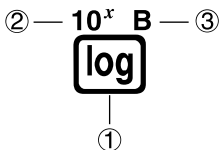
 : Important notes

 : Notes

 : Reference pages
P.000

1. Key Markings

Many of the calculator's keys are used to perform more than one function. The functions marked on the keyboard are color coded to help you find the one you need quickly and easily.



| | Function | Key Operation |
|---|----------|---------------|
| ① | log | |
| ② | 10^x | |
| ③ | B | |

The following describes the color coding used for key markings.

| Color | Key Operation |
|--------|---|
| Orange | Press and then the key to perform the marked function. |
| Red | Press and then the key to perform the marked function. |

2. Selecting Icons and Entering Modes

This section describes how to select an icon in the Main Menu to enter the mode you want.

•To select an icon

1. Press **MENU** to display the Main Menu.

MENU









Currently selected icon →



2. Use the cursor keys (◀, ▶, ▲, ▼) to move the highlighting to the icon you want.
 3. Press **EXE** to display the initial screen of the mode whose icon you selected.
- You can also enter a mode without highlighting an icon in the Main Menu by inputting the number or letter marked in the lower right corner of the icon.
 - Use only the procedures described above to enter a mode. If you use any other procedure, you may end up in a mode that is different than the one you thought you selected.

The following explains the meaning of each icon.

| Icon | Meaning |
|------|--|
| | Use this mode for arithmetic calculations and function calculations, and for calculations involving binary, octal, decimal and hexadecimal values. |
| | Use this mode to perform single-variable (standard deviation) and paired-variable (regression) statistical calculations, and to draw statistical graphs. |
| | Use this mode for storing and editing matrices. |
| | Use this mode for storing and editing numeric data. |
| | Use this mode to store graph functions and to draw graphs using the functions. |
| | Use this mode to store graph functions and to draw multiple versions of a graph by changing the values assigned to the variables in a function. |

| Icon | Meaning |
|---|---|
|  | Use this mode to store functions, to generate a numeric table of different solutions as the values assigned to variables in a function change, and to draw graphs. |
|  | Use this mode to store recursion formulas, to generate a numeric table of different solutions as the values assigned to variables in a function change, and to draw graphs. |
|  | Use this mode to draw graphs of implicit functions. |
|  | Use this mode to solve linear equations with two through six unknowns, quadratic equations, and cubic equations. |
|  | Use this mode to store programs in the program area and to run programs. |
|  | Use this mode to transfer memory contents or back-up data to another unit. |
|  | Use this mode to adjust the contrast of the display. |
|  | Use this mode to check how much memory is used and remaining, to delete data from memory, and to initialize (reset) the calculator. |

■ Using the Set Up Screen

The first thing that appears when you enter a mode is the mode's set up screen, which shows the current status of settings for the mode. The following procedure shows how to change a set up.

● To change a mode set up

1. Select the icon you want and press **EXE** enter a mode and display its initial screen. Here we will enter the RUN Mode.
2. Press **SHIFT** **SETUP** to display the mode's set up screen.
 - This set up screen is just one possible example. Actual set up screen contents will differ according to the mode you are in and that mode's current settings.

```

Mode           :Comp
Func Type     :Y=
Draw Type     :Connect
Derivative    :Off
Angle        :Rad
Coord        :On
Grid         :Off
IcomF|Dec|Hex|Bin|Oct
F1   F2   F3   F4   F5

```

3. Use the \blacktriangle and \blacktriangledown cursor keys to move the highlighting to the item whose setting you want to change.
4. Press the function key (**F1** to **F6**) that is marked with the setting you want to make.
5. After you are finished making any changes you want, press **EXIT** to return to the initial screen of the mode.

■ Set Up Screen Function Key Menus

This section details the settings you can make using the function keys in the set up display.

•Calculation/Binary, Octal, Decimal, Hexadecimal Setting Mode (Mode)

- | | | |
|------------------------|---|--|
| F1 (Comp) | General Arithmetic Calculation Mode | |
| F2 (Dec) | Specifies decimal values as default | |
| F3 (Hex) | Specifies hexadecimal values as default | |
| F4 (Bin) | Specifies binary values as default | |
| F5 (Oct) | Specifies octal values as default | |

•Graph Function Type (Func Type)

- | | | |
|--------------------------------------|--|--|
| F1 (Y=) | Rectangular coordinate graphs | |
| F2 (r=) | Polar coordinate graphs | |
| F3 (Parm) | Parametric coordinate graphs | |
| F4 (X=c) | Graphs in which value of X is constant | |
| F6 (\triangleright) | Next menu | |
| F1 (Y>) | $y > f(x)$ inequality graph | |
| F2 (Y<) | $y < f(x)$ inequality graph | |
| F3 (Y≥) | $y \geq f(x)$ inequality graph | |
| F4 (Y≤) | $y \leq f(x)$ inequality graph | |
| F6 (\triangleright) | Previous menu | |

- The setting you make for Func Type determines the variable name that is input when you press **KEY**.

•Graph Draw Type (Draw Type)

F1 (Con) Connection of points plotted on graph.

Draw Type :Connect

F2 (Plot) Plotting of points on graph without connection.

Con Plot

F1 F2

•Derivative Display Mode (Derivative)

F1 (On) Turns on display of derivative value when using Graph-to-Table, Table & Graph, and Trace.

Derivative :Off

F2 (Off) Turns off display of derivative value.

On Off

F1 F2

•Angle Unit (Angle)

F1 (Deg) Specifies degrees as default.

Angle :Rad

F2 (Rad) Specifies radians as default.

Deg Rad Gra

F3 (Gra) Specifies grads as default.

F1 F2 F3

•Graph Pointer Coordinates (Coord)

F1 (On) Turns on display of coordinates of current graph screen pointer location.

Coord :On

F2 (Off) Turns off display of coordinates of current graph screen pointer location.

On Off

F1 F2

•Graph Gridlines (Grid)

F1 (On) Turns on display of graph screen gridlines.

Grid :Off

F2 (Off) Turns off display of graph screen gridlines.

On Off

F1 F2

•Graph Axes (Axes)

F1 (On) Turns on display of graph screen axes.

Axes :On

F2 (Off) Turns off display of graph screen axes.

On Off

F1 F2



P.136



P.136



P.136

•Graph Axis Labels (Label)

F1 (On) Turns on display of graph screen axis labels.

Label :Off

F2 (Off) Turns off display of graph screen axis labels.

On Off
F1 **F2**

•Display Format (Display)

F1 (Fix) Displays screen for specification of number of decimal places.

Display :Norm1

F2 (Sci) Displays screen for specification of number of significant digits.

Fix Sci Norm Eng
F1 **F2** **F3** **F4**

F3 (Norm) Switches exponential format display range.

F4 (Eng) Engineering mode.



P.18

•Statistical Graph View Window Setting (Stat Wind)

F1 (Auto) Automatic setting of view window values for statistical graph drawing.

Stat Wind :Auto

F2 (Man) Manual setting of view window values for statistical graph drawing.

Auto Man
F1 **F2**

•Graph Function Display (Graph Func)

F1 (On) Turns on display of function during graph drawing and trace.

Graph Func :On

F2 (Off) Turns off display of function during graph drawing and trace.

On Off
F1 **F2**



P.161

•Graph Background (Background)

F1 (None) No graph background.

Background :None

F2 (PICT) Displays screen for specification of picture for graph background.

None PICT
F1 **F2**



P.282

•List File Specification (List File)

F1 (File 1)~

F6 (File 6) List file number (1 to 6) specification.

List File :File1

| | | | | | |
|-----------|-----------|-----------|-----------|-----------|-----------|
| File1 | File2 | File3 | File4 | File5 | File6 |
| F1 | F2 | F3 | F4 | F5 | F6 |

•Dual Screen Mode (Dual Screen)

The Dual Screen Mode setting you can select differs depending upon whether you are using the GRAPH Mode set up screen or the TABLE/RECUR Mode set up screen.



P.190

GRAPH Mode

F1 (Grph) Divides screen into two parts, each of which can be used for graphing.

Dual Screen :Off

F2 (GtoT) Divides screen into two parts for generation of numeric table from graph.

| | | |
|-----------|-----------|-----------|
| GrPh | GtoT | Off |
| F1 | F2 | F3 |

F3 (Off) Dual Screen off.

P.202



P.247

TABLE/RECUR Mode

F1 (T+G) Divides screen into two parts, one for graphing and one for a numeric table.

Dual Screen :Off

F2 (Off) Dual Screen off.

| | |
|-----------|-----------|
| T+G | Off |
| F1 | F2 |

•Simultaneous Graph Mode (Simul Graph)

F1 (On) Turns on simultaneous graphing of all functions in memory.

Simul Graph :Off

F2 (Off) Simultaneous graphing off (graphs drawn one-by-one).

| | |
|-----------|-----------|
| On | Off |
| F1 | F2 |



P.215

•Dynamic Graph Type (Dynamic Type)

F1 (Cnt) Continuous drawing of Dynamic Graphs.

Dynamic Type:Stop

F2 (Stop) Automatic stopping of Dynamic Graph drawing after 10 draws.

| | |
|-----------|-----------|
| Cnt | Stop |
| F1 | F2 |



P.238

• **Table & Graph Generation Settings (Variable)**

F1 (Rang) Table generation and graph drawing using numeric table range.

Variable :Range

P.238

F2 (LIST) Table generation and graph drawing using list data.

Ran3 **LIST**
F1 **F2**

• **Σ Data Display Mode (Σ Display)**

F1 (On) Turns on display of Σ value on recursion numeric table.

Σ Display :Off

F2 (Off) Turns off display of Σ value.

On Off
F1 **F2**

• **Implicit Function Graph Derivative Display Mode (Slope)**

F1 (On) Turns on display of derivative at current pointer location on implicit function graph screen.

Slope :Off

F2 (Off) Turns off display of derivative.

On Off
F1 **F2**

Abbreviations

- STAT Statistics
- MAT Matrix
- DYNA Dynamic Graph
- RECUR Recursion
- EQUA Equation
- PRGM Program
- CONT Contrast
- MEM Memory

3. Display

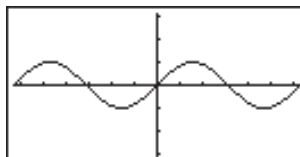
■ About the Display Screen

This calculator uses two types of display: a text display and a graphic display. The text display can show 21 columns and eight lines of characters, with the bottom line used for the function key menu, while the graph display uses an area that measures 127 (W) × 63 (H) dots.

Text Display



Graph Display



■ About Menu Item Types

This calculator uses certain conventions to indicate the type of result you can expect when you press a function key.

• Next Menu

Example: **HYP**

Selecting **HYP** displays a menu of hyperbolic functions.

• Command Input

Example: **sinh**

Selecting **sinh** inputs the sinh command.

• Direct Command Execution

Example: **DRAW**

Selecting **DRAW** executes the DRAW command.

■ Exponential Display

The calculator normally displays values up to 10 digits long. Values that exceed this limit are automatically converted to and displayed in exponential format. You can specify one of two different ranges for automatic changeover to exponential display.

Norm 1 10^{-2} (0.01) > $|x|$, $|x| \geq 10^{10}$

Norm 2 10^{-9} (0.000000001) > $|x|$, $|x| \geq 10^{10}$

● To change the exponential display range

1. Press **SHIFT** **SETUP** to display the Set Up Screen.
2. Use **▲** and **▼** to move the highlighting to "Display".
3. Press **F3** (Norm).

The exponential display range switches between Norm 1 and Norm 2 each time you perform the above operation. There is no display indicator to show you which exponential display range is currently in effect, but you can always check it by seeing what results the following calculation produces.

| | | |
|---|--|-------------------|
| AC 1 ÷ 2 0 0 EXE | <div style="border-bottom: 1px solid black; padding-bottom: 5px; display: inline-block;"> $1 \div 200$ </div> | $5.E-03$ (Norm 1) |
| | <div style="border-bottom: 1px solid black; padding-bottom: 5px; display: inline-block;"> $1 \div 200$ </div> | 0.005 (Norm 2) |

All of the examples in this manual show calculation results using Norm 1.

● How to interpret exponential format

| | | |
|----------|---|-----------|
| $1.2E12$ | → | $1.2E+12$ |
|----------|---|-----------|

$1.2E+12$ indicates that the result is equivalent to 1.2×10^{12} . This means that you should move the decimal point in 1.2 twelve places to the right, because the exponent is positive. This results in the value 1,200,000,000,000.

| | | |
|----------|---|-----------|
| $1.2E-3$ | → | $1.2E-03$ |
|----------|---|-----------|

$1.2E-03$ indicates that the result is equivalent to 1.2×10^{-3} . This means that you should move the decimal point in 1.2 three places to the left, because the exponent is negative. This results in the value 0.0012.

■ Special Display Formats

This calculator uses special display formats to indicate fractions, hexadecimal values, and sexagesimal values.

● Fractions

$$\boxed{456.12.23} \quad 456.12.23 \quad \dots \text{Indicates: } 456 \frac{12}{23}$$

● Hexadecimal Values

$$\boxed{ABCDEF12} \quad ABCDEF12 \quad \dots \text{Indicates: } ABCDEF12_{(16)}, \text{ which equals } -1412567278_{(10)}$$

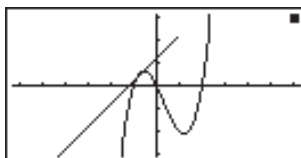
● Sexagesimal Values

$$\boxed{12.58244} \quad 12^{\circ}34'56.78'' \quad \dots \text{Indicates: } 12^{\circ} 34' 56.78''$$

- In addition to the above, this calculator also uses other indicators or symbols, which are described in each applicable section of this manual as they come up.

■ Calculation Execution Screen

Whenever the calculator is busy drawing a graph or executing a long, complex calculation or program, a black box (■) flashes in the upper right corner of the display. This black box tells you that the calculator is performing an internal operation.



4. Contrast Adjustment

Adjust the contrast whenever objects on the display appear dim or difficult to see.

•To display the contrast adjustment screen

Highlight the **CONT** icon in the Main Menu and then press **[EXE]**.

```
*****  
*          CONTRAST          *  
*****  
LIGHT          DARK  
[←]           [→]
```

Use **[◀]** and **[▶]** to adjust contrast.

- **[◀]** makes figures on the screen lighter, while **[▶]** makes them darker.
- Holding down **[◀]** or **[▶]** changes the contrast setting at high speed.

After adjusting the contrast, press **[MENU]** to return to the Main Menu.

5. When you keep having problems...

If you keep having problems when you are trying to perform operations, try the following before assuming that there is something wrong with the calculator.

■ Get the Calculator Back to its Original Mode Settings

1. In the Main Menu, select the **RUN** icon and press **EXE**.
2. Press **SHIFT** **SETUP** to display the Set Up Screen.
3. Highlight "Angle" and press **F2** (Rad).
4. Highlight "Display" and press **F3** (Norm) to select the exponential display range (Norm 1 or Norm 2) that you want to use.
5. Now enter the correct mode and perform your calculation again, monitoring the results on the display.



■ In Case of Hang Up

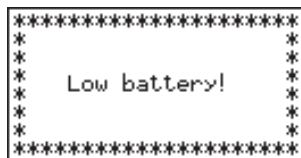
- Should the unit hang up and stop responding to input from the keyboard, press the P button on the back of the calculator to reset the memory. Note, however, that this clears all the data in calculator memory.



■ Low Battery Message

The low battery message appears while the main battery power is below a certain level whenever you press **AC/ON** to turn power on or **MENU** to display the Main Menu.

AC/ON or **MENU**



↓ About 3 seconds later



If you continue using the calculator without replacing batteries, power will automatically turn off to protect memory contents. Once this happens, you will not be able to turn power back on, and there is the danger that memory contents will be corrupted or lost entirely.

- You will not be able to perform data communications operations once the low battery message appears.